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Acute Ulcerative Endocarditis—
A Brief Resume of the Path-
ology of Eight Cases.

Presented, with specimens, to the Illinois State Medical Society,
May 17, 1893.

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Reprinted from the "Journal of the American Medical Association,"
June 10, 1893.



presented by the author -

CHICAGO:
PUBLISHED AT THE OFFICE OF THE ASSOCIATION.
1893.



ACUTE ULCERATIVE ENDOCARDITIS — A
BRIEF RÉSUMÉ OF THE PATHOL-
OGY OF EIGHT CASES.

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The following eight cases of malignant or acute ulcerative endocarditis, the heart lesion of each of which I have the honor to present to this society, occurred in the Cook County Hospital during the fifteen months ending April 1, 1893.

I wish to extend my thanks to all the members of the staff through whose hands these cases have passed from time to time for their gracious permission to utilize the material in this way; individual mention of names would embarrass the necessary concentration aimed at in this report.

These cases illustrate well the various forms of acute ulcerative endocarditis from an etiological, clinical, as well as anatomical standpoint and they particularly emphasize the difficulties so frequently encountered in the diagnosis of this affection.

The cases are arranged in the following groups:

- I. One instance of primary endocarditis of a normal value.
- II. Two instances of acute ulceration developing upon the sclerotic valves without any known infection atrium.
- III. Two instances of ulcerative endocarditis with

external lesions; in one infection of healthy valves, in the second infection of a sclerotic valve.

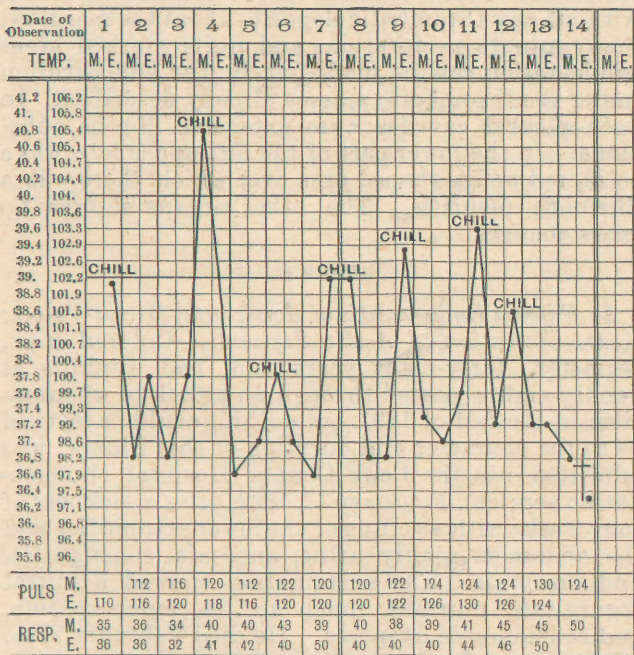
IV. Three instances of malignant endocarditis arising during the course of infectious processes elsewhere in the body.

GROUP I.

1. *Primary Malignant Endocarditis of Tricuspid Valves; Pulmonary Infarct; Chills and Intermittent Fever.*—Man, aged twenty-eight, molder; entered the county hospital, April 29, 1892. His family and personal history was negative; he had always enjoyed good health; he was taken ill six weeks before admission with pain in the back, chills and vomiting; since that time there had been almost daily chills followed by sweats. On entrance he was found to be jaundiced, his skin showing numerous scratches. His pulse was 100, respiration 35, temperature 102. Over the lower lobe of the left lung there was dullness, bronchial breathing, crepitant râles; the lungs were otherwise negative on examination. There was nothing unusual noticed about the heart. The liver and spleen were apparently normal. May 2. Crepitant râles over left lung in mammary and infra-mammary regions, while in the axillary regions there were moist râles, broncho-vesicular respiration and some loss of resonance. May 6. Patient is dull and stupid; there are a few moist râles over left lower lobe. May 11. Is getting weaker, has lost weight; the skin is dark and muddy, the sclera yellow; the spleen is palpable. The heart sounds appear normal, there is no increase in the area of dullness. The upper border of the liver reaches the sixth sterno-costal junction and a little below costal arch. The bones and joints are normal. There is pain over the liver. There is constipation. The annexed chart shows the pulse, respiration and temperature as well as the chills that occurred during

his sojourn in the hospital. May 13. Exploratory laparotomy, the probable diagnosis being abscess of the liver. No abscess was found. Death.

The post-mortem examination (by Dr. Durr, to whom I am greatly indebted for the specimen) showed the following: the pericardium showed no



To accompany the case of tricuspid endocarditis.

changes; the heart (Fig. 1) weighed 285 grams; the semilunar valves were competent to the water test. The tricuspid valves show large irregular masses of fibrin upon the auricular surface; these masses vary in thickness, in size and in outline; they are rough and granular; upon the cusp nearest the pul-

monary orifice is a large mass, about one cm. in height, projecting into auricle; in the center of the summit of this mass is an irregular opening leading into a cavity formed by the aneurismal bulging or sacculation of the valve out into the auricle. Near this aneurism is a smaller one, two mm. in diameter, without any thrombotic deposits about the margins; many minute perforations and quite marked areas of ulceration can be made out in the endocardium under the thrombotic masses already described. In both pleural cavities were extensive fibrous adhesions. In the lower part of the left upper lobe was a solid, red wedge-shaped area over which there was a fibrinous pleuritis. The other organs showed no gross changes.

GROUP II.

1. *Fibrous Endocarditis of Aortic and Mitral Valves; Acute Ulceration of Aortic Segments.*—Colored man, teamster, forty-eight years old, had syphilis at twenty-eight; passed through an attack of rheumatism in the fall of 1891, but nothing could be learned as to the character and duration of this illness; was admitted into the Cook County Hospital (homœopathic service), February 17, 1892, after a sickness of four weeks with swelling of the lower extremities and the abdomen, scanty urine, anorexia, constipation and insomnia. The examination showed a mitral regurgitant murmur, much ascites, much œdema, and considerable dyspnoea. He died February 27th, 1892, without having had any fever or other symptoms of acute infection while in the hospital.

The post-mortem examination showed œdema, ascites, hydrothorax, compression atelectasis of the right lung, cyanotic atrophy of the liver, chronic gastro-adenitis, passive congestion of the spleen and the following changes in the heart: it weighs 502 grams and appears equally enlarged as to both ven-

tricles; there are no external changes; the endocardium in the right half is negative; the aortic valves are incompetent to the water test; the mitral orifice admits two finger tips; the free margins of this valve are thickened, rounded, stiff, fibrous and the cordae tendineæ are also stiff and thick, but there are no recent vegetations. The aortic valves are much changed (Fig 2); the free margins are thickened and retracted and projecting from the ventricular surfaces near the free edges are long, filamentous, fibrinous masses; in the intercoronary segment is a perforation, about four mm. in diameter, with a crater-shaped mass of fibrin and calcareous granules around the ventricular margins; upon the center of the anterior mitral leaflet is a mass of granular thrombotic deposit corresponding to the point where the margins of the valve aneurism would touch the endocardium during systole. Finally there is a small loss of substance in the endocardium below the attached margin of the perforated aortic cusp. The myocardium showed no other changes except those of hypertrophy and dilatation already referred to. It was not possible to demonstrate any bacteria in the margins of the valvular aneurism.

2. *Chronic Changes in the Aortic Valves; Acute Ulcerative Aortic Endocarditis. Rupture of Acute Aneurism of Membranous Part of Interventricular Septum.*—Man, age thirty, was admitted with history of having been sick for five weeks, but any accurate idea as to the nature of the disease could not be obtained. He was in a chill at the time of admission and auscultation showed a rubbing, systolic murmur over the heart which could be followed into the great vessels; he had a high temperature, rapid pulse and respiration, and appeared moribund from exhaustion. Death after twenty-four hours. The post-mortem examination showed the following changes in the heart: It was considerably increased in size, weighing 450

grams; the aortic valves were incompetent to the water-test; the free margins of these valves were thick, stiff and retracted; upon their ventricular surfaces were large fibrinous masses adherent to necrotic areas in the endocardium; the thrombotic deposits were most marked upon the intercoronary segment and in the mural endocardium immediately below the attached margin of this valve was an opening surrounded by an irregular fibrinous mass; this opening led into an aneurismal sacculatation of the membranous part of the inter-ventricular septum or undefended space which projected into the right auricle between the valves; upon its summit was a perforation whose margins were covered with a huge fibrinous excrescence. In the spleen were three characteristic, medium sized, anæmic infarcts without any evidence of commencing suppurative softening. The other organs in the body were macroscopically normal with the exception of a few pleuritic fibrous adhesions and cloudy swelling in the kidneys and the liver. Micrococci were found in the sections made from the aortic valves and the aneurism of the membranous part of the septum, but no cultivation experiments were made.

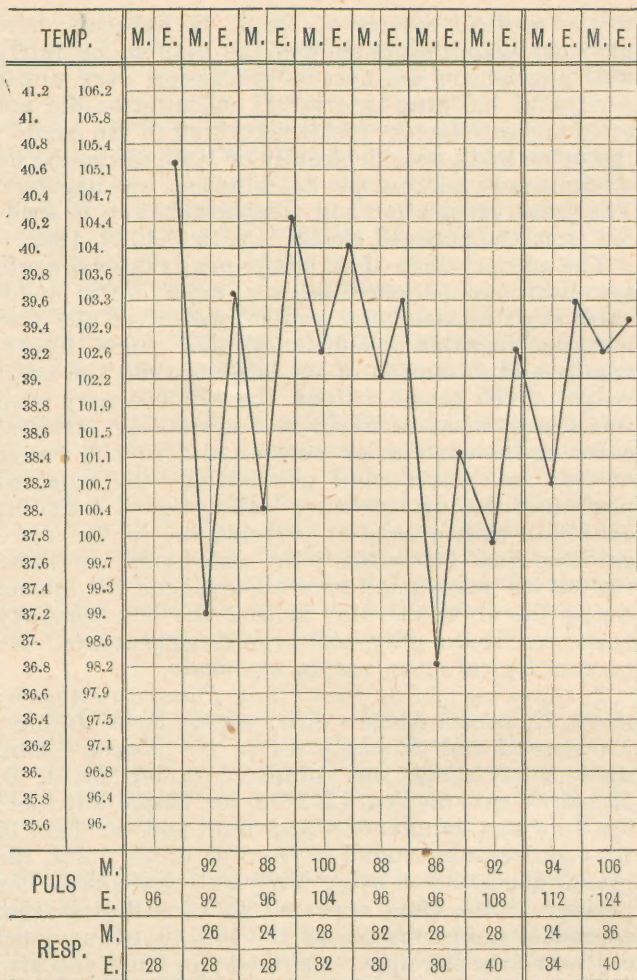
GROUP III.

1. *Fibrous Endocarditis of Aortic Valves; Superficial Burn of Right Arm; Acute Aortic Ulceration; Sero-fibrinous Pericarditis.*—Man, aged twenty-four, received a superficial burn of the right arm for which he was admitted to the hospital the next day. The arm was enclosed in a wet boric acid dressing and three days later this was changed to a boric acid and bismuth dusting powder, the burn being nearly healed. On the same day the patient was seized with headaches; he had chills; the temperature went up to 105.2, and there appeared severe pain in the lower part of left chest. The patient was transferred

to the medical service of Dr. R. H. Babcock; here physical examination showed the man to be fairly well nourished; dullness on percussion over upper portion of left lung anteriorly; auscultation did not yield any satisfactory result according to the record; the urine had a specific gravity of 1024, contained no albumin and microscopic examination was negative. The pulse, respiration and temperature can be studied from the annexed chart. Death Feb. 11, 1892.

The autopsy showed an anatomically typical acute sero-fibrinous pericarditis; a chronic aortic endocarditis with thickening and retraction of the free margins, valvular insufficiency, and some hypertrophy and dilatation of the left ventricle, the heart weighing 480 grams. Upon the left coronary cusp was a large mass of fibrin and crumbling material covering the ventricular surface, and in the center of this area was a small perforation; the adjacent portion of the intercoronary leaflet showed a similar condition with a smaller perforation; in the myocardium just below the joint attachment of these two valves was a small necrotic area and the intima lining the sinus valvular behind the left coronary cusp presented a gray, soft necrotic appearance. No bacteriological examination was made.

2. *Gangrene of Foot from Frost; Pulmonary Abscess; Acute Ulcerative Endocarditis; Septic Renal Infarct; Streptococci and Staphylococci in the Tissues.*—Man, aged thirty-three, was admitted under Dr. J. B. Murphy's care on Feb. 12, 1893, for frozen left foot; the foot was gangrenous and foul, and on Feb. 15 the foot was amputated in front of ankle joint, the line of demarcation being fairly well developed. The patient at the time appeared to be suffering from sapræmic symptoms and on the 16th there was noted dullness over the upper right lobe in front and also considerable cough. At this time the temperature was 105, the pulse 108, respiration 38 and the record



To accompany the case of aortic endocarditis after burns of right arm.

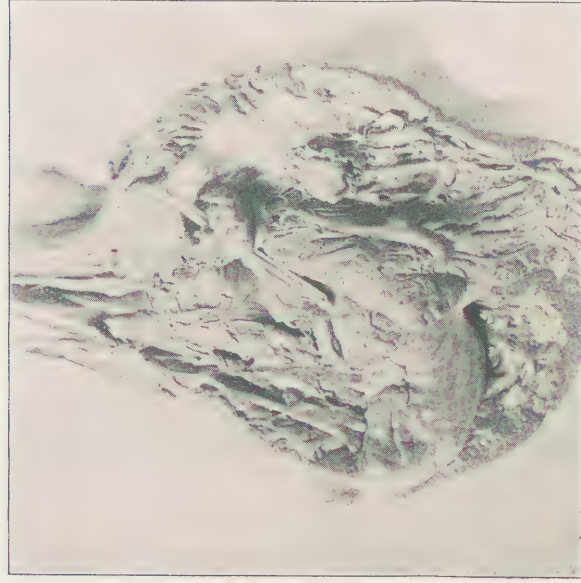


Fig. 1.

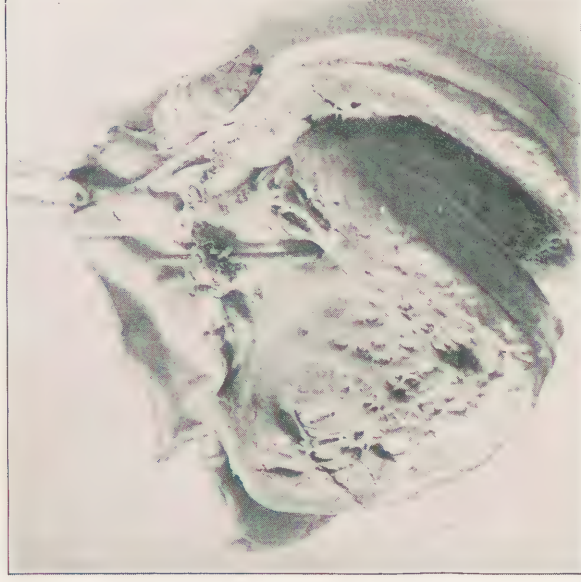


Fig. 2.



Fig. 3.

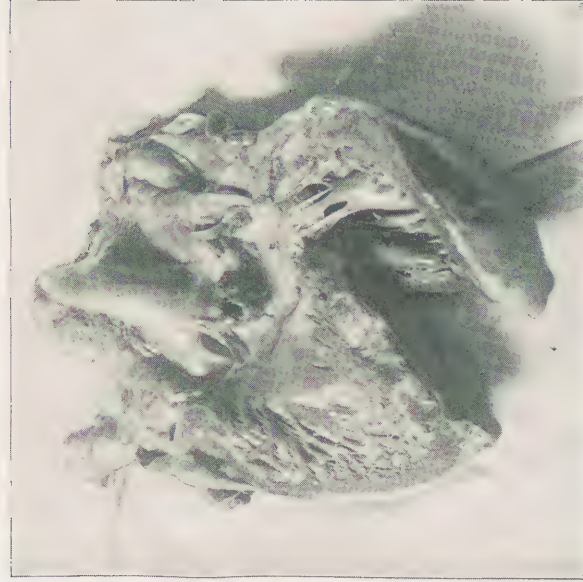


Fig. 4.

shows the temperature to have remained high with some morning intermissions until death occurred, Feb. 22, the pulse increasing in frequency. The stump did not during life appear otherwise than pursuing an aseptic healing. After death there was found the following:

The stump was free from suppuration and there was no thrombo-phlebitis in its vicinity. In the right upper lobe was found a cavity as large as a hen's egg, filled with thin, yellow, purulent fluid, without any distinct communication with the bronchi, the wall being quite thick, containing soft yellow foci. In the heart, which was otherwise quite normal, the aortic valves showed large thrombotic masses upon the ventricular surfaces, quite firmly attached to necrotic areas in the endocardium. The right kidney contained a wedge-shaped infarct which was in process of purulent disintegration. There was an acute splenic tumor.

Cover glass preparations from the lung abscess, the aortic valves, and the softened infarct showed cocci in large numbers and especially streptococci; inoculation of gelatine and agar tubes produced cultures of staphylococcus aureus and streptococcus. Sections from the valves and from the wall of the pulmonary infarct, stained according to Gram or with Löffler's methylene blue, showed cocci in large numbers, frequently arranged in rows; the sections of the valves, stained by other methods as well, showed the characteristic changes of acute ulcerative endocarditis.

GROUP IV.

1. *Acute Malignant Endocarditis of Mitral Valves Secondary to Lobar Pneumonia.*—A man, forty-five years old, was admitted moribund from a fibrinous pneumonia of the lobes of both lungs. The post-mortem examination showed the lower lobe of the

right lung to be in the stage of gray while the lower left lobe was in that of red pneumonic hepatization; there was also a fibrous, retracting endocarditis of the free aortic valve margins with valvular insufficiency, hypertrophy and dilatation of the left ventricle. Upon the auricular surface of the mitral valves were massive deposits of fibrin upon a necrotic endocardium (Fig. 3) and in one place there was a circular perforation of the valve, one cm. in diameter, which was covered with fibrin. There were no evidences of embolism in any of the organs. Unfortunately decomposition had so far advanced at the time of the autopsy that no bacteriological examination was attempted.

2. *Lobar Pneumonia; Right Empyæma; Operation; Acute Ulcerative Endocarditis of Aortic Valve Segment and Adjacent Endocardium.*—Man, porter, age thirty-eight, admitted February 28, 1893, with following history: He drinks beer and whisky every day; he had pleurisy three months ago and malaria several years back. The present illness commenced eight days ago with fever, cough, pain in upper part of chest but now in lower right side; he can't take a deep breath; has had no chill; the expectoration has been white and yellow. Examination shows a fairly well nourished man; conjunctivæ a little yellow, tongue clean, tremulous; respiration short and catchy; over lung are numerous moist râles and over right lower lobe posteriorly are fine crackling râles. Pulse 108, temperature 102, respiration 32 on admission. On March 8, the temperature had gradually reached the normal figure, pulse was then 68, respiration 28. In two days there is noticed a slight evening temperature elevation; on March 16, the temperature at 8 A. M. was 100, at 8 P. M. 102.6 and it continued at about this range until the 23d when the diagnosis of right empyæma was made and the patient was transferred to the surgical service of Dr.

Murphy where a portion of the sixth rib was removed just below the angle of the right scapula, the pleura incised with escape of pus, and drainage tube inserted. The patient's condition at the end of the operation is noted as very poor and on the 25th of March he died.

The autopsy showed two encapsulated pus masses in the upper posterior part of the cavity not reached by the drainage tube; some atelectasis of the right lung; complete fibrous obliteration of the left pleural cavity and a small area of broncho-pneumonia in the lower left lobe; also adhesions between the liver and the diaphragm. In the heart the intercornary aortic segment showed upon the ventricular aspect a crumbling, gray, friable mass, one cm. in height, two cm. in diameter with a crater-shaped opening into a valvular aneurismal cavity; the endocardium below the attached margin of the valve was necrotic and crumbling and showed irregular openings leading into spaces in the wall of the ventricle without any perforations into any of the neighboring cavities; upon the auricular surface of the anterior mitral segment was a small thrombotic deposit on a necrotic area in the endocardium which may be connected with the lesions described about the aortic valve; otherwise the heart was normal; it weighed 240 grams. In each kidney was a small anæmic infarct which in the left kidney had commenced to disintegrate. There was an acute splenic tumor and the solid organs showed parenchymatous degeneration. The bacteriological examination showed in the necrotic, mural and valvular endocardium both streptococci and staphylococci and also a bacillus which appeared like the bacterium coli commune.

3. *Acute Leptomeningitis; Ulcerative Endocarditis of Aortic Valves.*—A man, thirty years old, was admitted unconscious with the history of becoming suddenly ill the previous day; his pulse was 120, temperature

102, respiration 20; the pupils reacted to light; the retinae were normal; the stomach was empty; the heart and the lungs could not be satisfactorily examined on account of constant loud breathing. In a few hours the unconsciousness deepened into coma, there were involuntary discharges, and the nurse reported spasms. Death after twenty-four hours. The autopsy showed a double fibrous pleuritis with pleurogenous interstitial changes in the lower right lobe; pulmonary oedema; fibrous perisplenitis and perihepatitis; cloudy swelling and chronic interstitial changes in the kidneys; chronic deforming endarteritis, and the following changes in the brain and in the heart: There was much subdural turbid fluid and the pia-arachnoid was oedematous and in the meshes over the pons and the cerebellum was purulent fluid; all the ventricles contained purulent turbid fluid with a yellow sediment in the dependent parts of these cavities. There were no macroscopic cerebral changes. The cavities in the vicinity of the brain were negative on opening and inspection. The heart (Fig. 4) weighed 320 grams. There are no changes to be noted except those upon the aortic valves the intercoronary segment of which presents a circular perforation two cm. in diameter from the aortic aspect; around the ventricular margins is massed a crumbling wall of grayish, granular material, one cm. high, the opening in the summit being seven mm. across. The other aortic leaflets are negative on examination. There were no old changes in the valves. In the center of the ventricular aspect of the anterior mitral segment is an irregular loss of substance, two mm. in diameter, leading into a small cavity, filled with granular material between the endocardial surfaces of the valve. Cover glass preparations show streptococci in large numbers in the meningeal exudate and in the granular material about the per-

foration in the aortic valve. No culture experiments were made.

Resumé:—Of these eight cases the instance of tricuspid endocarditis appears to be, as far as observations go, an example of primary or cryptogenetic disease of the healthy tricuspid valves. There are two cases of the not so very infrequent engraftment of an acute ulcerative process upon the sclerotic valves of chronic heart disease without the known presence of any wound, septic process or acute infectious disease. Then there are two cases connected with external lesions through which the infection might have occurred; in one the probable atrium was a superficial burn, but this case was further complicated by a sero-fibrinous pericarditis whose exact relation to the malignant endocarditis can not at this time be established; in the second case it is quite clear that a streptococcus infection took place from a gangrenous foot causing a pulmonary abscess, acute aortic ulceration, and a suppurative anæmic renal infarct.

The three remaining cases are associated with acute diseases elsewhere in the body; one with a double fibrinous pneumonia, one with an acute leptomeningitis, the infection coming from an unknown source; the third case of this kind occurred in a man who died with the diagnosis of empyæma following lobar pneumonia.

All the cases occurred in men belonging to the laboring class; the youngest being twenty-four, the oldest fifty years of age.

There was one instance of tricuspid and one of mitral disease: in the other six cases the aortic valves were primarily involved and in three the mural endocardium showed areas of necrosis and ulceration which, in one instance led to the production of an aneurism of the undefended space and rupture into the right auricle; in one case the aorta

was attacked by the extension of the process from one of the valves. It is also of interest to note the spot of vegetation or necrosis in the center of the ventricular surface of the anterior mitral flap where it would come in contact with the vegetating mass or aneurismal bulging of the aortic valves; this spot consequently appears to be due to contact infection and was present in three of the six instances of aortic disease. In three of the aortic cases the valves were the seat of a chronic endocarditis upon which the acute process implanted itself; in one of these cases the bacteriologic examination failed to reveal any bacteria and it would seem that the inflammatory and necrotic changes in the endocardium had fallen into temporary or permanent quiet suggesting the probability of recovery from the acute symptoms; this corresponds well with the clinical facts in the case which show that the patient died from the effects of an uncompensated valvular lesion rather than from an acute infection (Group I, Case I). In one of these instances of acute, destructive changes developing upon sclerotic valves was a history of previous attack of rheumatic fever obtained, to which the chronic endocarditis could be traced.

Otherwise the anatomic and histologic changes presented by these specimens are so typical and characteristic of ulcerative endocarditis as to require little elucidation; they show vegetative and necrotic changes in profusion with the production of typical valvular aneurisms and subsequent rupture. It is quite noticeable that in only four of the cases were there evidences of embolism and infarcts and here the embolic changes were quite limited; as a rule the showers of infected emboli from the endocardial vegetations and ulcerations constitute a striking feature in the clinical as well as the anatomic manifestations of this form of endocarditis.

A number of facts and considerations in regard to

the etiology and pathology of acute ulcerative endocarditis may be summarized as follows:

1. The disease is caused by the localization of microbes in the blood upon the endocardium. The streptococcus pyogenes, the micrococcus lanceolatus (pneumococcus), the staphylococcus pyogenes are found most frequently and in the order named. Various other microbes have been found also, such as the pus microbes, the bacterium coli commune, the gonococcus, the bacillus typhosus, as well as bacteria that have not been found in other diseases and are in so far as yet peculiar to malignant endocarditis. Recently the bacillus diphtheriæ was found in the endocardial lesion (Howard, *J. Hopk. Hosp. Bull.*, April, 1893). Experimentally the disease can be produced by first causing some mechanical or chemical injury to the valvular endocardium and subsequently injecting cultures of various bacteria into the blood, or by intravenous injections of cultures of staphylococcus pyogenes aureus on potato suspended in water with scrapings from the potato when the micrococcous agglomerations attach themselves to the endocardium more readily than the single cocci (Rosenbach, Wyssokowitch, Weichselbaum, Prudden, Fränkel and Sängner, Netter, Gerardieu, Ribbert).

2. Acute ulcerative endocarditis is met with as a secondary lesion in the acute infectious diseases, notably and most frequently pneumonia, also in meningitis, acute articular rheumatism, the specific fevers, gonorrhœa, dysentery and so on. It is frequently incorporated into suppurative, septic and pyæmic processes. Finally it may occur as a primary or cryptogenetic affection, developing without any known or demonstrable infection atrium. From the mycotic endocardial foci, microbes and infected fragments may be carried away by the blood current and give rise to embolism in the various parts of

the body, local necroses, and secondary pus accumulations.

3. In over one-half of the cases (three-fourths according to Osler), the acute ulceration is implanted on an old valvular lesion, the absence of endothelium and the roughness presenting assailable points for microbic invasion. This is the only competent reason for the occurrence of an overwhelming majority of the instances in the left heart but the explanation is not complete, because of the cases affecting primarily healthy valves; over two-thirds occur in the left side and about one-third in the right half.*

EXPLANATION OF PLATE:

FIG. 1. Acute ulcerative endocarditis of tricuspid valve with rupture of valve aneurism through which match has been passed. Group I.

FIG. 2. Acute ulcerative endocarditis engrafted on sclerotic aortic valves; perforated aneurism; necrotic spot in center of anterior mitral flap. Chronic mitral endocarditis. Group II, Case I.

FIG. 3. Acute ulcerative endocarditis of mitral valves following lobar pneumonia. Group IV, Case I.

FIG. 4. Acute ulcerative endocarditis of aortic valves; ruptured aneurism; necrotic spot in center of anterior cusp. Group IV, Case 3. Acute leptomeningitis.

* Out of seventy-eight cases of ulcerative endocarditis of healthy valves, twenty-four were right sided and fifty-four left sided.

NOTE.—In Hamilton's Text-Book of Pathology, Vol. I. will be found references to the more important literature on ulcerative or malignant endocarditis.



